



Exterior Stone Conservation Study

Philadelphia Merchants' Exchange

Pennsylvania Blue Project Background

Pennsylvania marble, also known as Pennsylvania blue or Montgomery County Marble, was an important regional building stone during the first half of the nineteenth century. However, by the middle of the nineteenth century its use as a building stone had declined due to poor weathering properties and competition from other local quarries.

Over the past 10 years, the University of Pennsylvania's Architectural Conservation Laboratory along with the National Park Service have been involved in the documentation and treatment assessment of Pennsylvania blue marble buildings in Independence National Historical Park.

Starting in 2004, a conditions survey of the Merchants' Exchange was begun with the intent of preparing a detailed survey of the exterior masonry. The project goals are to record and determine the extent and types of stone deterioration and to recommend applicable stone conservation treatments.



Location: West Elevation, Column Four
Source: University of Pennsylvania

The first floor columns were analyzed to understand the current conditions based on location, past treatments, and other recorded conditions. Due to available archival materials, an analysis was conducted to determine the stones' deterioration over time.

There are two major deterioration mechanisms that affect the columns. 1) Black surface encrustation caused by the presence of gypsum, seen in the photo above, which results from attack by air pollution, originating from vehicular traffic and nearby local industry. 2) Delamination attributed to freeze-thaw cycling which occurs during the warming and cooling of the stone during winter days. When water enters the pores of the stone and freezes, the resulting expansion causes it to delaminate.

Current Analysis



North Elevation, Column Nine February 19, 1957 and Summer 2004
Source: INHP Archives and University of Pennsylvania

Conservation Treatment Testing

The conservation treatment study is focused primarily on finding a mitigation posed by the presence of gypsum on the surface and subsurface of the marble. Presently, the surface is held together by the growth of gypsum crystals.

One solution is to immobilize this soluble salt by turning it into an insoluble compound. This can be achieved by the use of barium hydroxide resulting in the formation of the extremely insoluble barium sulfate. On site treatment testing is underway to determine the effectiveness of this type of conservation treatment.

Park Superintendent: Mary A. Bomar
Supervising Architectural Conservators:
Dr. A. Elena Charola and Professor Frank G. Matero
Architectural Conservation Student: Lyles McBratney



University of Pennsylvania students, Lyles McBratney and Jennifer Correia, applying the barium hydroxide treatment
Location: West Elevation, Column Four

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This preservation work is funded directly by visitor fees collected in national parks.